

AMENDMENT

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molten metal at least partially downward, wherein the connective portion formed in the impeller comprises a tapered, non-threaded bore extending through said impeller; and

a nut wherein the second end of the drive shaft includes a threaded portion positioned through the non-threaded bore of the open impeller, the nut being threaded onto the threaded portion for removably securing the open impeller to said second end.

32. The device of claim 31 wherein the portion that directs molten metal at least partially downward is an angled surface.

33. The device of claim 31 wherein each of the plurality of outwardly extending blades includes angled surfaces for directing molten metal at least partially downward.

34. The device of claim 31 wherein the impeller comprises four outwardly extending blades formed substantially in a cross shape, wherein each of the outwardly extending blades includes an angled surface for directing molten metal at least partially in a downward direction.

35. The device of claim 34 wherein the angled surfaces are formed at a 45° angle with respect to an axis of impeller rotation.

36. The device of claim 31 wherein the impeller has an overall length of at least 28".

37. The device of claim 34 wherein, in addition to the angled surface, each of the four outwardly extending blades further includes a substantially vertical surface for directing molten metal outward.

38. An open impeller for circulating molten metal in a molten metal bath, the impeller comprising:

a hub;

three or more blades extending outwardly from said hub, there being spaces between the blades, wherein at least one of said three or more blades includes an angled surface for directing molten metal at least partially in a downward direction, and wherein at least one of said three or more blades includes a vertical surface for directing molten metal at least partially in radially outward direction, said rotor further including a non-threaded tapered bore for connecting to a drive shaft.

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39. The impeller of claim 38 wherein the impeller includes four blades formed in substantially a cross shape.

40. The impeller of claim 38 wherein each of the three or more blades includes an angled surface and a vertical surface.

41. The impeller of claim 38 wherein the angled surface is formed at a 45° angle.

42. The impeller of claim 38 wherein each of the three or more blades extends outward from said hub by at least 10".

43. A device for generating a downward stream of molten metal, the device comprising:

a drive source;

a drive shaft having a first end connected to the drive source and a second end;

and

the impeller of claim 38 connected to the second end of the drive shaft.

44. A molten metal mixing device, the device comprising:

a drive source;

a drive shaft having a first end connected to the drive source and a second end;

an impeller for mixing molten metal, the impeller comprising two or more blades and a non-threaded tapered bored for receiving the second end of the drive shaft; and

a fastener to secure the second end to the non-threaded tapered bore.

45. The mixing device of claim 44 wherein the fastener comprises a threaded fastener and wherein the second end of the drive shaft includes threads for receiving said threaded fastener.

46. The mixing device of claim 45 wherein the threaded fastener comprises a nut.

47. A device for generating a downward stream of molten metal, the device comprising:

a drive source;

a drive shaft having a first end connected to the drive source and a second end;

and

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an open impeller having a plurality of outward extending blades wherein each of the plurality of blades has a portion that directs molten metal at least partially downward, and each of the blades has a height and a width, the height being less than four times the width.

48. The device of claim 48 wherein the portion is an angled surface.

49. The device of claim 47 that further includes a connective portion in the impeller for attaching the impeller to the drive shaft, the connective portion comprising a tapered, non-threaded bore.

50. The device of claim 47 wherein the width is greater than the height.

51. A device for generating a downward stream of molten metal, the device comprising:
a drive source;
a draft shaft having a first end connected to the drive source and a second end;
and
an open impeller means for directing molten metal at least partially downward.

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52. The device of claim 50 wherein the impeller means includes a plurality of blades wherein each of the blades comprises an angled surface and includes a height and width, the height being less than four times the width.

REMARKS

By this Amendment, Applicant cancels claims 1-18 and adds new claims 31-51. Thus claims 19-52 are all the claims pending in the present application. Claims 19-30 stand rejected. Reconsideration and allowance of all pending claims are respectfully requested in view of the following remarks.

I. RESTRICTION.

Applicant notes the Restriction Requirement of September 24, 2001 has been withdrawn. The Examiner is thanked for reconsidering and withdrawing the requirement. Applicant submits the claims added herein are similar to those cancelled and thus should not be restricted for the reasons of record.